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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/534,881

05/13/2005

Kia Silverbrook

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SILVERBROOK RESEARCH PTY LTD
393 DARLING STREET
BALMAIN, 2041
AUSTRALIA

EXAMINER

STEPHENS, JUANITA DIONNE

ART UNIT

PAPER NUMBER

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/534,881	Applicant(s) SILVERBROOK ET AL.	
	Examiner Juanita D. Stephens	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Amendment filed 5/28/2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-21, 23-36 and 38-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-21, 23-36 and 38-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/13/06, 5/13/05</u> | 6) <input type="checkbox"/> Other: _____ |

Claims 6, 22 and 37 have been canceled in Amendment filed 5/28/2007. However, according to Applicants arguments filed 5/28/2007 claim 36 was cancelled.

Applicant need to clarify.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 8, 16-21, 24, 32-36, 39 and 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Drake et al. (US 5,030,971).

Kubby discloses a method of ejecting a drop of an ejectable liquid from a printhead and a printer system incorporating said printhead, comprising: **1)** a plurality of nozzles (col 3, lns 13-15), **2)** at least one heater element (col 3, lns 64-68) corresponding to each nozzle, wherein each heater element is in the form of a suspended beam(18) (col 3, lns 50-53), arranged for being suspended over at least a portion of a bubble forming liquid so as to be in thermal contact therewith, and each heater element configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element (col 3, lns 64-68), **3)** being configured to support the bubble forming

liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle (Fig. 5), **4)** wherein the bubble forming liquid (ink) and the ejectable liquid (ink) are of common body of liquid (common to inkjet printheads utilizes heaters), **5)** wherein each heater element is in the form of a cantilever beam (18) (col 3, lns 50-51), **6)** configured to receive a supply of the bubble forming liquid at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said bubble forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point, **7)** wherein each heater element has two opposite sides and is configured such that said gas bubble formed by that heater element is formed at both of said sides of that heater element (abstract; col 4, lns 47-65; col 5, lns 8-16), **8)** wherein each heater is substantially covered by a conformal protective coating, such that the coating is seamless (col 4, lns 11-17) and **9)** being configured to print on a page and to be a pagewidth printhead (col 1, lns 13-16).

The method of claims 33-36, 39 and 47 are disclosed in Kubby in view of Drake et al. as discussed above with respect to the apparatus.

Kubby does not teach the plurality of nozzles defining a planar ejection aperture and the heater element extending in a plane parallel to that of the ejection aperture and each heater element has two opposite sides parallel to the plan of the ejection aperture (which is a roof shooter printhead). Drake at least teaches the equivalence of the side/edge shooter configuration and the roof shooter configuration which propel droplets

from nozzles in a direction normal to the surface of the bubble generating heating elements (col 1, lns 15-34 and Figs. 3 and 6C). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby with the roof shooter configuration as taught to be old by Drake et al. for the purpose of supplying ink to the nozzles via a passageway through the heater plates, which is advantages because of the proximity of the paper to the printhead.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7, 10-12, 23, 26-28, 38, and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Drake et al. (US 5,030,971) as applied to claims 1-5, 8, 16-21, 24, 32-36, 39 and 47 above, and further in view of Silverbrook (US 6,019,457).

Kubby in view of Drake et al. teaches the invention, with the exception of **1)** wherein each heater has an actuation energy of less than 500 nanojoules (nJ), **2)** wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element, **3)** a structure that is formed by chemical vapor deposition (CVD), said nozzles being incorporated in the structure, and **4)** structure which is less than 10 microns thick, said

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nozzles being incorporated in the structure. Silverbrook at least teaches wherein each heater (120) has an actuation energy of less than 500 nanojoules (nJ) (col 19, lns 8-10), wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element (as shown by the shape of the heater element 120 in Fig. 10-12), a structure (overcoat 142) that is formed by chemical vapor deposition (CVD) said nozzles being incorporated in the structure (col 8, lns 65-66), and a structure which is less than 10 microns thick, said nozzles being incorporated in the structure (col 9, lns 8-10). It would have been further obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby in view of Drake et al. with the structure as taught to be old by Silverbrook for the purpose of providing mechanical strength to resist the shock of exploding or collapsing vapor bubbles and providing protection against the external environment.

The method of claims 38 and 41-43 are disclosed in Kubby in view of Drake et al. and further in view of Silverbrook as discussed above with respect to the apparatus.

5. Claims 9, 25 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Drake et al. (US 5,030,971) as applied to claims 1-5, 8, 16-21, 24, 32-36, 39 and 47 above, and further in view of Feinn et al. (US 6,543,879 B1).

Kubby in view of Drake et al. teaches the claimed invention, with the exception of the areal density of the nozzles relative to the substrate surface exceeding 10,000

nozzles per square cm of substrate surface. Feinn et al. discloses the areal density of the nozzles relative to the substrate surface exceeding 10,000 nozzles per square cm of substrate surface (abstract; col 16, lns 11-13). It would have been further obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby in view of Drake et al. with the areal density as taught to be old by Feinn et al. for the purpose of improving resolution.

The method of claim 40 is disclosed in Kubby in view of Drake et al. and further in view Feinn et al. as discussed above with respect to the apparatus.

6. Claims 13, 29 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Drake et al. (US 5,030,971) as applied to claims 1-5, 8, 16-21, 24, 32-36, 39 and 47 above, and further in view of Komuro (US 4,965,594)

Kubby in view of Drake et al. teaches the claimed invention, with the exception of the heater being formed on different layers. Komuro at least teaches an inkjet print head having a heater that is formed in a plurality of different layers (col 3, lns 35-65, as seen in Fig. 1). It would have been further obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby in view of Drake et al. by providing a heater that is formed in a plurality of different layers as taught to be old by Komuro for the purpose of enabling drops of different sizes to be ejected in order to produce a graded recording.

The method of claim 44 are disclosed in Kubby in view of Drake et al. and further in view of Komuro as discussed above with respect to the apparatus.

7. Claims 14, 30, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 65,706,041) in view of Drake et al. (US 5,030,971) as applied to claims 1-5, 8, 16-21, 24, 32-36, 39 and 47 above, and further in view of The Fabrication of Reliability Testing of Ti/TiN Heaters (DeMoor).

Kubby in view of Drake et al. teaches the claimed invention, with the exception of each heater element is formed of solid material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50. DeMoor at least teaches that it is desirable to use a heater made of Ti/TiN (Ti has an atomic number of 22) in integrated MEMS systems (a thermal inkjet is such a system), because the material provide the advantages of CMOS fabrications (low cost and uniformity) in combination with a very high reliability (see Conclusion). It would have been further obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby in view of Drake et al. by providing the Ti/TiN heater as taught to be old by DeMoor, for the purpose of providing advantages of CMOS fabrication in combination with high reliability.

The method of claim 45 is disclosed in Kubby in view of Drake et al. and further in view of DeMoor as discussed above with respect to the apparatus.

8.. Claims 15, 31, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Drake et al. (US 5,030,971) as applied to claims 1-5, 8, 16-21, 24, 32-36, 39 and 47 above, and further in view of Yamashita et al. (US 5,969,005).

Kubby in view of Drake et al. teaches the claimed invention, with the exception of wherein each heater element is configured for a mass of less than 10 nanograms. Yamashita et al. at least teaches that the ink is jetted at an output of from 1 to 70 nanograms per droplet to effect recording (abstract, col 30, lns 29-32, lns 38-40; col 31, lns 18-22). It would have been further obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby in view of Drake et al. with the output of 1 to 70 nanograms per droplet to effect recording as taught to be old by Yamashita et al. for the purpose of providing a greater surface area of the droplet, thus strongly improving image quality.

The method of claim 46 is disclosed in Kubby in view of Drake et al. and further in view of Yamashita et al. as discussed above with respect to the apparatus.

Response to Arguments

9. Applicant's arguments with respect to claims 1-5, 7-21, 23-36, and 38-47 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Comments

11. The Applicant indicated on the Arguments filed 5/28/2007 that claim 36 was canceled. However, the Examiner noticed that in the Amendments filed, claim 37 was actually canceled.

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex (Monday-Thursday 9:00 am -6:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juanita D. Stephens
Primary Examiner
Art Unit 2853

/Juanita D. Stephens/
Primary Examiner, Art Unit 2853
February 28, 2008